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**Memorandum:**

**To:** Users of the "*Rationale for the Development and Application of Generic Soil, Groundwater and Sediment Criteria for Use at Contaminated Sites in Ontario - 1996*"

**From:** Standards Development Branch

**Date:** December 3, 1996

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**Subject: ERRATUM : SOIL AND GROUNDWATER CRITERIA CHANGES**

*Rationale for the Development and Application of Generic Soil, Groundwater and Sediment Criteria for Use at Contaminated Sites in Ontario - 1996"*

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This notice provides instructions for the revision of certain text and appendices in the guideline support document entitled: *Rationale for the Development and Application of Generic Soil, Groundwater and Sediment Criteria for Use at Contaminated Sites in Ontario - 1996*.

The need for these changes has resulted from the detection of a mathematical error in one of the vapour transport models that was used to modify the soil criteria for medium/fine textured soil conditions (shown in round brackets in the criteria Tables A and B). These changes have also resulted in the addition of a medium/fine textured soil criterion for petroleum hydrocarbons (gas/diesel) in the industrial/commercial land use category of Table B. There is also the need for asterisks in Tables C and D, to signal cases where the values are now similar to the corresponding Table A and B values. In addition, a unit transcription error from one of the aquatic toxicity studies that was utilized has been detected which affects all soil and groundwater remediation criteria for pyrene (Tables A-D).

The revisions are as follows:

## 1. Revisions to Text in Section 3.2.3.2.1 of the Rationale Document

Two changes should be made to the text at the bottom of page 37 (shown here as italicized text for clarification):

- a) Where it states "and after making all unit conversions, S/IA equation (5) becomes:" should read "*and after making all unit conversions (refer to Appendix B.1.11), S/IA equation (5) becomes:*".
- b) Where it states "Therefore, for medium/fine textured soils, the S/IA dilution factor (D) in eq. (4) of the S/IA vapour transport model was given a value of  $6.25 \times 10^4$  should read "*Therefore, for medium/fine textured soils, the dilution factor (D) in eq. (4) of the S/IA vapour transport model was given a value of  $6.25 \times 10^4$  and a factor of 6.25 was added to eq. (7).*"

## 2. Revisions to Text in Section 3.2.4.5 of the Rationale Document

A change should be made to the text in the fourth paragraph of this section (shown here as italicized text for clarification):

Where it states "Where groundwater is non-potable, the Level II TPH criterion (1000 ppm) applies to all surface soils in both the residential/parkland and industrial/commercial land use categories medium/fine textured soils." should read "*Where groundwater is non-potable, the Level II TPH criterion (1000 ppm) applies to all surface soils in both the residential/parkland and industrial/commercial land use categories for coarse textured soils as well as the residential/parkland land use category for medium/fine textured soils. A value of 2000 ppm (2 x Level II criterion) was selected as the criterion for medium/fine textured surface soils in the industrial/commercial land use category.*"

## 3. Revisions to Text in Section 3.2.5.2 of the Rationale Document

The words in brackets "(Table C and D)" should be removed from the last sentence in the second paragraph of this section. The sentence should read "*The soil pH range acceptable for applying generic criteria to sub-surface soils (>1.5m depth) was set at pH 5.0 to 11.0 because pH at depth is naturally higher than at the surface due to higher levels of carbonates.*"

#### **4. Revisions to Appendix A.1: Ontario Soil, Groundwater and Sediment Quality Criteria Tables**

The nature of the revisions to the criteria tables in Appendix A.1 are as follows:

- a) In Tables A and B, the actual numbers in round brackets change, while in Tables C and D, double asterisks are now required for some criteria, as the unchanged Table C and D criteria values are now numerically equal to the corresponding medium/fine textured soil criteria values in Tables A and B, respectively. In addition, a medium/fine textured soil criterion is added for petroleum hydrocarbons (gas/diesel) in the industrial/commercial land use category of Table B.
- b) In the second case, a unit transcription error from one of the toxicity studies that was utilized has been detected which affects all soil and groundwater remediation criteria for pyrene in Tables A to D.
- c) In the third case, a few soil criteria values in Tables C and D have been identified that should have been marked with one asterisk, as the levels in Tables C and D are numerically equal to the corresponding values in Tables A and B. There is no change in the numerical values for these parameters. Also, for clarification the caveat at the top of Tables A and B should be revised to read as follows: "*Soil Criteria for Inorganics in this Table apply only where Surface Soil pH is 5.0 to 9.0 and for Full Depth Use, the Subsurface Soil pH is 5.0 to 11.0*"

The following four tables show the revisions that need to be made to medium/fine textured soil remediation criteria for a number of organic chemicals in Appendix A.1.1 (Table A), Appendix A.1.2 (Table B), Appendix A.1.3 (Table C) and Appendix A.1.4 (Table D)

**TABLE A: Revised Surface Soil and Groundwater Remediation Criteria for Three Land Uses (Agricultural, Residential/Parkland and Industrial/Commercial) in a Potable Groundwater Situation.**

Soil Criteria for Inorganics in this Table apply only where Surface Soil pH is 5.0 to 9.0 and for Full Depth Use, the Subsurface Soil pH is 5.0 to 11.0				
TABLE A:	Revised Soil Remediation Criteria (ng/g)			Potable Groundwater Criteria (ng/L)
Chemical Compound	Agricultural Land Use	Residential/ Parkland Land Use	Industrial/ Commercial Land Use	All Land Use Categories
BROMOMETHANE	(0.38)	(0.38)	(0.38)	
CARBON TETRACHLORIDE	(0.64)	(0.64)	(0.64)	
DICHLOROETHANE, 1,2-	(0.05)	(0.05)	(0.05)	
DICHLOROETHYLENE, 1,1-	(0.015)	(0.015)	(0.015)	
DICHLOROPROPANE, 1,2-	(0.12)	(0.12)	(0.12)	
DICHLOROPROPENE, 1,3-	(0.04)	(0.04)	(0.04)	
ETHYLENE DIBROMIDE	(0.01)	(0.01)	(0.012)	
HEPTACHLOR	(0.12)	(0.12)	(0.15)	
HEXACHLOROBUTADIENE	(2.2)	(2.2)	(2.2)	
HEXACHLOROETHANE	(6.3)	(6.3)	(8.5)	
PYRENE	250	250	250	40
TETRACHLOROETHANE, 1,1,1,2-	(0.12)	(0.12)	(0.12)	
TRICHLOROETHYLENE	(3.9)	(3.9)	(3.9)	
VINYL CHLORIDE	(0.0075)	(0.0075)	(0.0075)	

( ) Criterion value in brackets applies to medium/fine textured soils only.

**TABLE B: Revised Surface Soil and Groundwater Remediation Criteria for Two Land Uses  
(Residential/Parkland and Industrial/Commercial) in a Non-Potable Groundwater Situation.**

Soil Criteria for Inorganics in this Table apply only where Surface Soil pH is 5.0 to 9.0 and for Full Depth Use, the Subsurface Soil pH is 5.0 to 11.0			
TABLE B:	Revised Soil Remediation Criteria (mg/t)		Revised Non-Potable Groundwater Criteria (ug/L)
Chemical Compound	Residential/ Parkland Land Use	Industrial/ Commercial Land Use	Both Land Use Categories
BENZENE	(25)	(25)	
BIS(2-CHLOROISOPROPYL)ETHER	(1.9)	(2.6)	
BROMOFORM	(14)	(14)	
BROMOMETHANE	(0.38)	(0.38)	
CARBON TETRACHLORIDE	(0.64)	(0.64)	
CHLOROBENZENE	(30)	(30)	
CHLOROFORM	(4.9)	(4.9)	
DICHLOROETHANE, 1,1-	(100)	(140)	
DICHLOROETHANE, 1,2-	(0.14)	(0.14)	
DICHLOROETHYLENE, 1,1-	(0.015)	(0.015)	
DICHLOROPROPANE, 1,2-	(0.12)	(0.12)	
DICHLOROPROPENE, 1,3-	(0.041)	(0.041)	
ETHYLBENZENE	(500)	(1000)	
ETHYLENE DIBROMIDE	(0.01)	(0.02)	
HEPTACHLOR	(0.12)	(0.15)	
HEXACHLOROBUTADIENE	(2.4)	(2.4)	
HEXACHLOROETHANE	(6.3)	(13)	
METHYL ISOBUTYL KETONE	(69)	(69)	
METHYL TERT BUTYL ETHER		(410)	
METHYLNAPHTHALENE, 2-(*)1-)	(1000)	(1600)	
PETROLEUM HYDROCARBONS (gas/diesel)		(2000)	
PYRENE	250	250	40
STYRENE	(7.7)	(7.7)	
TETRACHLOROETHANE, 1,1,1,2-	(0.12)	(0.12)	
TETRACHLOROETHANE, 1,1,2,2-	(0.23)	(0.23)	
TOLUENE	(150)	(150)	
TRICHLOROETHYLENE	(3.9)*	(3.9)*	
VINYL CHLORIDE	(0.0075)	(0.0075)	
XYLENES	(210)	(210)	

(\*) Chlorine value in brackets applies to medium fine textured soils only. \* Soil criterion adopted from Table A to account for degradation to vinyl chloride

**TABLE C: Revised Sub-Surface Soil Remediation Criteria for Two Land Uses (Residential/Parkland and Industrial/Commercial) in a Potable Groundwater Situation.**

SOIL CRITERIA FOR INORGANICS IN THIS TABLE APPLY ONLY WHERE SOIL pH IS 5.0 TO 11.0		
TABLE C:	Revised Soil Remediation Criteria (mg/g)	
Chemical Compound	Residential/ Parkland Land Use	Industrial/ Commercial Land Use
CHRYSENE		Criterion requires one asterisk after value
DICHLOROETHANE, 1,2-	Criterion requires two asterisks after value	Criterion requires two asterisks after value
DICHLOROETHYLENE, CIS-1,2-	Criterion requires one asterisk after value	Criterion requires one asterisk after value
DICHLOROETHYLENE, TRANS-1,2-	Criterion requires one asterisk after value	Criterion requires one asterisk after value
DICHLOROPROPENE, 1,3-	Criterion requires two asterisks after value	Criterion requires two asterisks after value
ETHYLENE DIBROMIDE		Criterion requires two asterisks after value
HEPTACHLOR		Criterion requires two asterisks after value
HEXACHLOROBUTADIENE	Criterion requires two asterisks after value	Criterion requires two asterisks after value
HEXACHLOROETHANE		Criterion requires two asterisks after value
PYRENE	250*	250*
TETRACHLOROETHYLENE	Criterion requires one asterisk after value	Criterion requires one asterisk after value
TRICHLOROETHANE, 1,1,1-	Criterion requires two asterisks after value	Criterion requires two asterisks after value
TRICHLOROETHYLENE	Criterion requires two asterisks after value	Criterion requires two asterisks after value

\* Criterion value is the same as the corresponding criterion in Table A.

**TABLE D: Revised Sub-Surface Soil Remediation Criteria for Two Land Uses (Residential/Parkland and Industrial/Commercial) in a Non-Potable Groundwater Situation.**

SOIL CRITERIA FOR INORGANICS IN THIS TABLE APPLY ONLY WHERE SOIL pH IS 5.0 TO 11.0		
TABLE D:	Revised Soil Remediation Criteria ( $\mu\text{g/g}$ )	
Chemical Compound	Residential/ Parkland Land Use	Industrial/ Commercial Land Use
DICHLOROETHYLENE, CIS-1,2-	Criterion requires one asterisk after value	Criterion requires one asterisk after value
DICHLOROETHYLENE, TRANS-1,2-	Criterion requires one asterisk after value	Criterion requires one asterisk after value
HEPTACHLOR		Criterion requires two asterisks after value
METHYL ISOBUTYL KETONE	Criterion requires two asterisks after value	Criterion requires two asterisks after value
METHYL TERT BUTYL ETHER		Criterion requires two asterisks after value
METHANAPHTHALENE 2-(*)1-		Criterion requires two asterisks after value
PYRENE	250*	250*
TETRACHLOROETHYLENE	Criterion requires one asterisk after value	Criterion requires one asterisk after value
TRICHLOROETHANE, 1,1,1-	Criterion requires two asterisks after value	Criterion requires two asterisks after value
TRICHLOROETHYLENE	Criterion requires two asterisks after value	Criterion requires two asterisks after value

\* Criterion value is the same as the corresponding criterion in Table B.

**5. Revisions to Soil and Groundwater Component Values for Pyrene in Appendices A.2.1 to A.2.8.**

The following revisions are required in each of the 18 soil remediation criteria component summary tables comprising Appendix A.2.1 through A.2.8:

- a) Replace the pyrene value of 1.3 in the column labelled "S-/GW3" with the value **250**.
- b) In each case, the new value remains **bold faced** and the cell is shaded to indicate that this component was selected as the soil remediation criterion for pyrene.

In addition, each of the two groundwater remediation criteria component summary tables (the final table in Appendix A.2.1 and A.2.2, respectively) requires the following revisions:

- a) Replace the pyrene value of 0.04 in the column labelled "GW3" with the value **40**.
- b) The font of the new value is **bold faced** and the cell is **shaded** to indicate that this component was selected as the groundwater remediation criterion for pyrene.
- c) The pyrene value of 0.2 in the "MOEE MDL Value" column is returned to a normal font and the cell is returned to an unshaded format.

**6. Revisions to S/IA Component Values in Appendices A.2.5 and A.2.6: Table A and B Criteria Components - Medium/Fine Textured Soil (Surface/Full Depth).**

The following five criteria component tables show the revisions that need to be made as a result of the mathematical correction in the soil-to-indoor air vapour transport model for medium/fine textured soil. All values shown in the "Soil/Ind Air" column of each table are revised values.

Each revised soil-to-indoor air component value, which continues to be the selected soil remediation criterion for a given chemical, is shown in bold font and in a shaded cell.

For some chemicals in each table, a different component value has become the selected soil remediation criterion as a result of revisions to the soil-to-indoor air component values. In these cases the other component value is shown in bold font and in a shaded cell along with the revised soil-to-indoor air component value which remains in a normal font and an unshaded cell.

**7. Revision to Substitute Criteria Component Value for Petroleum Hydrocarbons (gas/diesel) in Appendix A.2.6: Table B Criteria Components - Non-Potable Groundwater Situation - Medium/Fine Textured Soil (Surface/Full Depth)**

The following revision is required in the industrial/commercial category summary table of Appendix A.2.6:

- a) Replace the petroleum hydrocarbon (gas/diesel) value of 1000 in the column labelled "Substitute Criteria" with the value 2000.

TABLE A: COMPONENTS FOR MOEE SOIL REMEDIATION CRITERIA (SURFACE/FULL DEPTH) - POTABLE GROUNDWATER SITUATION - MEDIUM/FINE TEXTURED MEDIUM/FINE TEXTURED SOIL

CHEMICAL PARAMETER	AGRICULTURAL CATEGORY (all depths) (ug/g)										Soil/Ind Air	
	MOEE Soil Mol	MASS. PQL	ONT Soil Blgnd	Ceiling Value	Ecotoxicity Criteria MOEE	Nett. C	Substitute Criteria Value	Basis	S1 Risk	Soil Leaching (Mod. MASS.) S-GW1	S-GW2	S-GW3
ACETONE												12000
ALDRIN												0.93
BENZENE												(0.19) 33
BENZO(a)PYRENE												300000
BIS(2-CHLOROETHYL)ETHER												0.81
BIS(2-CHLOROSOPROPYL)ETHER												5.1
BIS(2-ETHYLHEXYL)PHthalATE												100000
BROMOFORM												14
BROMOMETHANE												0.38
CARBON TETRACHLORIDE												(0.04) 0.84
CHLORDANE												110
CHLOROBENZENE												(20) 50
CHLOROFORM												(0.069) 4.9
DICHLOROBENZENE, 1,2- (o-DCB)												1700
DICHLOROBENZENE, 1,4- (p-DCB)												5200
DDT												2900
DICHLOROETHANE, 1,1-												140
DICHLOROETHANE, 1,2-												0.14
DICHLOROETHYLENE, 1,1-												0.015
DICHLOROPROpane, 1,2-												0.52
DICHLOROPROPENE, 1,3-												0.041
DIELDRIN												1.3
ETHYLBENZENE												1800
ETHYLENE DIBROMIDE												0.035
HEPTACHLOR												0.53
HEPTACHLOR EPOXIDE												13
HEXAChLOROBENZENE												71
HEXAChLOROBUTADIENE												24
HEXAChLOROETHANE												24
METHYL ETHYL KETONE												11000

**TABLE A: COMPONENTS FOR MOEE SOIL REMEDIATION CRITERIA (SURFACE/FULL DEPTH) - POTABLE GROUNDWATER SITUATION - MEDIUM/FINE TEXTURED**

CHEMICAL PARAMETER	AGRICULTURAL CATEGORY (all depths) (ug/g)										
	MOEE Soil MDL	MASS. PQL	CNT Soil Bigrd	Ceiling Value	Ecotoxicity Criteria MOEE / Netw. C	Substitute Criteria Value	Basis	Soil Contact S1 Risk	Soil Leaching (Mod. MASS.) S-GW1	Soil Leaching (Mod. MASS.) S-GW2	Soil Leaching (Mod. MASS.) S-GW3
METHYL ISOBUTYL KETONE											360
METHYL TERT BUTYL ETHER											740
METHYLENE CHLORIDE											840
METHYLNAPHTHALENE, 2-(*)-											1800
NAPHTHALENE											760
PENTACHLOROPHENOL											7300
PHENOL											290000
STYRENE											(2.6) 7.7
TETRACHLOROETHANE, 1,1,1,2-											0.12
TETRACHLOROETHANE, 1,1,2,2-											0.23
TETRACHLOROETHYLENE											(24) 140
TOLUENE											210
TRICHLOROBENZENE, 1,2,4-											640
TRICHLOROETHANE, 1,1,1-											160
TRICHLOROETHANE, 1,1,2-											(1.2) 550
TRICHLOROETRYLENE											(0.71) 6.6
TRICLOROPHENOL, 2,4,6-											7200
VINYL CHLORIDE											0.0014
XYLENES											210

c Cancer Risk nc Noncancer Risk

+ S-1 Risk Value determined from human health toxicity data derived by MOEE Standard Development Branch staff.

\* MOEE Soil Clean-up Guideline (SCUG) for boron is based on a hot water extract, and was developed by MOEE Standards Development Branch staff.

\*\* MOEE Soil Clean-up Guideline (SCUG) for cadmium (coarse textured soil) is based on human health, but is applied here for the protection of grazing animals \*\*\* Soil criterion is not available

(-) Value in brackets is based on meeting the indoor air cancer risk concentration which is below the indoor air background concentration and the provision that if both are detected in the soil, the sum of the two concentrations cannot exceed the soil criterion.

(\*) 2-methyl napthalene soil criterion is applicable to 1-methyl napthalene with the provision that if both are detected in the soil, the sum of the two concentrations cannot exceed the soil criterion.

**TABLE A: COMPONENTS FOR MOEE SOIL REMEDIATION CRITERIA (SURFACE/FULL DEPTH) - POTABLE GROUNDWATER SITUATION - MEDIUM/FINE TEXTURED SOILS**

**TABLE A: COMPONENTS FOR MOEE SOIL REMEDIATION CRITERIA (SURFACE/FULL DEPTH) - POTABLE GROUNDWATER SITUATION - MEDIUM/FINE TEXTURED SOILS**

CHEMICAL PARAMETER	RESIDENTIAL/PARKLAND CATEGORY (ug/g)											
	MOEE Soil MDL	MASS. PDL	CNT Soil Bkgnd.	Ceiling Value	Ecotoxicity Criteria		Substitute Criteria		Soil Leaching (Mod. MASS.)			
					MOEE	Neth. C	Value	Basic	S1 Risk	SC-W1	SC-W2	SC-W3
METHYL ETHYL KETONE												
METHYL ISOBUTYL KETONE												
METHYL TERT BUTYL ETHER												
METHYLENE CHLORIDE												
METHYLNAPHTHALENE, 2-(*)-												
NAPHTHALENE												
PENTACHLOROPHENOL												
PHENOL												
STYRENE												
TETRACHLOROETHANE, 1,1,1,2-												
TETRACHLOROETHANE, 1,1,2,2-												
TETRACHLOROETHYLENE												
TOLUENE												
TRICHLOROBENZENE, 1,2,4-												
TRICHLOROETHANE, 1,1,1-												
TRICHLOROETHANE, 1,1,2-												
TRICHLOROETHYLENE												
TRICHLOROPHENOL, 2,4,6-												
VINYL CHLORIDE												
XYLEMES												
c Cancer Risk nc Noncancer Risk												

+ S1 Risk Value determined from human health toxicity data derived by MOEE Standards Development Branch staff

\* MOEE Soil Clean-up Guideline (SCUG) for boron is based on a hot water extract, and was developed by MOEE Standards Development Branch staff

( ) Value in brackets is based on meeting the indoor air background concentration which is below the indoor air background concentration used in the Mass approach.

(\*) 2-methyl napthalene soil criterion is applicable to 1-methyl napthalene with the provision that if both are detected in soil, the sum of the two concentrations cannot exceed the soil criterion.

\*\* Soil criterion not available

**TABLE A: COMPONENTS FOR MOEE SOIL REMEDIATION CRITERIA (SURFACE/FULL DEPTH) - POTABLE GROUNDWATER SITUATION - MEDIUM/FINE TEXTURED SOILS**

CHEMICAL PARAMETER	INDUSTRIAL/COMMERCIAL CATEGORY (ug/g)						Soil Contact S2 Risk	Soil Leaching (Mod. MASS.)			Soil/Ind Air S/A
	MOEE Soil MDL	MASS. PQL	ONT Soil Blgnd.	Ceiling Value	Ecotoxicity Criteria MOEE	Substitute Criteria Neth C Value		S-GW1	S-GW2	S-GW3	
ACETONE											12000
ALDRIN											0.93
BENZENE											(0.19) 33
BENZO(a)PYRENE											300000
BIS(2-CHLOROETHYL)ETHER											0.81
BIS(2-CHLOROPROPYL)ETHER											5.1
BIS(2-ETHYLHEXYL)PHthalate											1000000
BROMOFORM											14
BROMOMETHANE											0.38
CARBON TETRACHLORIDE											(0.044) 4.64
CHLORDANE											110
CHLOROBENZENE											(20) 50
CHLOROFORM											(0.069) 4.9
DICHLOROBENZENE, 1,2- (o-DCB)											1700
DICHLOROBENZENE, 1,4- (p-DCB)											5200
DDT											2900
DICHLOROETHANE, 1,1-											140
DICHLOROETHANE, 1,2-											0.14
DICHLOROETHYLENE, 1,1-											0.015
DICHLOROPROPANE, 1,2-											0.041
DICHLOROPROPENE, 1,3-											0.041
DIELDRIN											1.3
ETHYL BENZENE											1800
ETHYLENE DIBROMIDE											0.055
HEPTACHLOR											0.53
HEPTACHLOR EPoxide											13
HEXAChlorOBENZENE											71
HEXAChlorOBUTADIENE											2.4
HEXAChlorOETHANE											24

**TABLE A: COMPONENTS FOR MOEE SOIL REMEDIATION CRITERIA (SURFACE/FULL DEPTH) - POTABLE GROUNDWATER SITUATION - MEDIUM/FINE TEXTURED SOILS**

CHEMICAL PARAMETER	INDUSTRIAL/COMMERCIAL CATEGORY ( $\mu\text{g/g}$ )										
	MOE	MASS.	ONT. Soil	Ceiling	Ecotoxicity Criteria		Subacute Criteria		Soil Leaching (Mod. MASS.)		
Soil MDL	POL	Bkgnd.	Value	MOE	Nett. C	Value	Basis	S2 Risk	S-GW1	S-GW2	S-GW3
METHYL ETHYL KETONE											11000
METHYL ISOBUTYL KETONE											360
METHYL TERT BUTYL ETHER											740
METHYLENE CHLORIDE											640
METHYLNAPHTHALENE, 2, ("1")											1800
NAPHTHALENE											760
PENTACHLOROPHENOL											7300
PHENOL											260000
STYRENE											(2.8) 7.7
TETRACHLOROETHANE, 1,1,1,2-											4,12
TETRACHLOROETHANE, 1,1,2,2-											0.23
TEFLON											(2.4) 140
TOLUENE											210
TRICHLOROBENZENE, 1,2,4-											640
TRICHLOROETHANE, 1,1,1-											160
TRICHLOROETHANE, 1,1,2-											(1.2) 590
TRICHLOROETHYLENE											(0.71) 8.6
TRICLOROPHENOL, 2,4,6-											7200
VINYL CHLORIDE											0.0073
XYLENES											210
c Cancer Risk nc Noncancer Risk											

- + S-2 Risk Value determined from human health toxicity data derived by MOEE Standards Development Branch staff
- \* MOEE Soil Clean-up Guideline (SCUG) for boron is based on a hot water extract, and was developed by MOEE Standards Development Branch staff
- \*\* Inorganic mercury criteria used
- \*\*\* Soil criterion not available
- ( ) Value in brackets is based on meeting the indoor air background concentration which is below the indoor air background concentration used in the Mass approach.
- (1-) 2-methyl napthalene soil criterion is applicable to 1-methyl napthalene with the proviso that if both are detected in the soil, the sum of the two concentrations cannot exceed the soil criterion

**TABLE B: COMPONENTS FOR MOEE SOIL REMEDIATION CRITERIA (SURFACE/FULL DEPTH) - NON-POTABLE GROUNDWATER SITUATION - MEDIUM-FINE TEXTURED SOIL**

CHEMICAL PARAMETER	RESIDENTIAL/PARKLAND (ug/g)										Soil Leaching (Mod. Mass.) S-GW2	Soil Leaching (Mod. Mass.) S-GW3	Soil Ind Air SIA
	MOEE Soil MDL	MASS. Pol	ONT Soil Blgnd.	Ceiling Value	Ecotoxicity Criteria MOEE	Neth. C	Substitute Criteria Value	Basis	S1 Risk				
ACETONE													12000
ALDRIN													0.83
BENZENE													(0.19) 33
BENZO(a)PYRENE													300000
BIS(2-CHLOROETHYL)ETHER													0.81
BIS(2-CHLOROISOPROPYL)ETHER													1.8
BIS(2-ETHYLHEXYL)PHthalATE													5.1
BROMOFORM													1000000
BROMOMETHANE													0.34
CARBON TETRACHLORIDE													(0.24) 0.64
CHLORDANE													110
CHLOROBENZENE													(20) 50
CHLOROFORM													(0.089) 4.3
DICHLOROBENZENE, 1,2- (o-DCE)													1700
DICHLOROBENZENE, 1,4- (p-DCE)													5200
DDT													2900
DICHLOROETHANE, 1,1-													140
DICHLOROETHANE, 1,2-													0.14
DICHLOROETHYLENE, 1,1-													0.013
DICHLOROPROPANE, 1,2-													0.12
DICHLOROPROPENE, 1,3-													0.041
DIEDRIN													1.3
ETHYL BENZENE													1800
ETHYLENE DIBROMIDE													0.035
HEPTACHLOR													0.53
HEPTACHLOR EPOXIDE													13
HEXAChLOROBENZENE													71
HEXAChLOROBUTADIENE													2.4
HEXAChLOROETHANE													24
													6.3

**TABLE B: COMPONENTS FOR MOEE SOIL REMEDIATION CRITERIA (SURFACE/FULL DEPTH) - NON-POTABLE GROUNDWATER SITUATION - MEDIUM-FINE TEXTURED SOILS**

CHEMICAL PARAMETER	RESIDENTIAL/PARKLAND (ug/g)										Soil Leaching (Mod. MASS.)			Soil/Ind Air	
	MOEE Soil MDL	MASS. PQL	ONT Soil Bkgnd.	Ceiling Value	Ecotoxicity Criteria MOEE	Substitute Criteria Neut. C	Soil Contact SI Risk	S-GWZ	S-GW3	S/A	S/A	S/A	S/A	S/A	S/A
METHYL ETHYL KETONE															11000
METHYL ISOBUTYL KETONE															360
METHYL TERT BUTYL ETHER															740
METHYLENE CHLORIDE															840
METHYLNAPHTHALENE, 2-(1-)															1800
NAPHTHALENE															780
PENTACHLOROPHENOL															7300
PHENOL															290000
STYRENE															(2.8) 7.7
TETRACHLOROETHANE, 1,1,1,2-															0.43
TETRACHLOROETHANE, 1,1,2,2-															0.23
TOULENE															(24) 140
TRICHLOROBENZENE, 1,2,4-															210
TRICHLOROETHANE, 1,1,1-															540
TRICHLOROETHANE, 1,1,2-															160
TRICHLOROXYLYLENE															(1.2) 550
TRICHLOROPHENOL, 2,4,6-															(0.7) 6.6
VINYL CHLORIDE															7200
XYLENES															6.0073
c Cancer Risk nc Noncancer Risk															210
+ S-1 Risk Value determined from human health toxicity data derived by MOEE Standards Development Branch staff.															
* MOEE Soil Clean-up Guideline (SCUG) for boron is based on a hot water extract, and was developed by MOEE Standards Development Branch staff.															** Soil criterion not available.
# Soil criterion from Table A (potable groundwater situation) adopted to account for degradation to vinyl chloride															
( ) Value in brackets is based on meeting the indoor air cancer risk concentration which is below the indoor air background concentration used in the Mass. approach.															
(1-) 2-methyl naphthalene soil criterion is applicable to 1-methyl naphthalene with the provision that if both are detected in the soil, the sum of the two concentrations cannot exceed the soil criterion.															

+ S-1 Risk Value determined from human health toxicity data derived by MOEE Standards Development Branch staff.

\* MOEE Soil Clean-up Guideline (SCUG) for boron is based on a hot water extract, and was developed by MOEE Standards Development Branch staff.

# Soil criterion from Table A (potable groundwater situation) adopted to account for degradation to vinyl chloride

( ) Value in brackets is based on meeting the indoor air cancer risk concentration which is below the indoor air background concentration used in the Mass. approach.

(1-) 2-methyl naphthalene soil criterion is applicable to 1-methyl naphthalene with the provision that if both are detected in the soil, the sum of the two concentrations cannot exceed the soil criterion.

TABLE B: COMPONENTS FOR MOOE SOIL REMEDIATION CRITERIA (SURFACE/FULL DEPTH) - NON-POTABLE GROUNDWATER SITUATION - MEDIUM/FINE TEXTURED SOILS

MEDIUM/FINE TEXTURED SOIL	INDUSTRIAL/COMMERCIAL CATEGORY (up to)											
	MOOE Soil MDL	MASS POL	ONT Soil Bkgnd.	Ceiling Value	Ecoxicity Criteria MOOE	Neth. C	Substitute Criteria Value	Basis	S2 Risk	Soil Leaching (Mod. MASS.) S-GW2	Soil Leaching (Mod. MASS.) S-GW3	Soln/m Air
ACETONE												12000
ALDRIN												0.93
BENZENE							25					(0.19) 33
BENZO(a)PYRENE												300000
BIS(2-CHLOROETHYL)ETHER												0.61
BIS(2-CHLOROISOPROPYL)ETHER												5.1
BIS(2-ETHYLHEXYL)PHTHALATE												1000000
BROMOFORM												14
BROMOMETHANE												0.38
CARBON TETRACHLORIDE												(0.044) 4.64
CHLORDANE												110
CHLOROBENZENE						30						(20) 50
CHLOROFORM												(0.063) 4.9
DICHLOROBENZENE, 1,2- (o-DCB)												1700
DICHLOROBENZENE, 1,4- (p-DCB)												5200
DDT												2900
DICHLOROETHANE, 1-												144
DICHLOROETHANE, 1,2-												0.14
DICHLOROETHYLENE, 1,1-												0.015
DICHLOROPROPANE, 1,2-												0.12
DICHLOROPROPENE, 1,3-												0.041
DIELDRIN												1.3
ETHYL BENZENE					1000							1800
ETHYLENE BROMIDE							0.02	b				0.035
HEPTACHLOR												0.53
HEPTACHLOR EPOXIDE												13
HEXAChLOROBUTADIENE												71
HEXAChLOROETHANE												2.4
												24
												13

**TABLE B: COMPONENTS FOR MOEE SOIL REMEDIATION CRITERIA (SURFACE/FULL DEPTH) - NON-POTABLE GROUNDWATER SITUATION - MEDIUM/FINE TEXTURED SOILS**

CHEMICAL PARAMETER	INDUSTRIAL/COMMERCIAL CATEGORY (ug/g)										
	MOEE		MASS.		ONT Soil Ceiling		Substitute Criteria		Soil Contact		
	Soil MDL	PQL	Bligrd.	Value	MOEE	Nett. C	Value	Basic	S2 Risk	SGW2	SGW3
METHYL ETHYL KETONE											
METHYL ISOBUTYL KETONE											
METHYL TERT BUTYL ETHER											
METHYLENE CHLORIDE											
METHYLNAPHTHALENE, 2, (*1)											
NAPHTHALENE											
PENTACHLOROPHENOL											
PETROLEUM HYDROCARBONS (gasoline)											
PHENOL											
STYRENE											
TETRACHLOROETHANE, 1,1,1,2-											
TETRACHLOROETHANE, 1,1,2,2-											
TETRACHLOROETHYLENE											
TOLUENE											
TRICHLOROBENZENE, 1,2,4-											
TRICHLOROETHANE, 1,1,1-											
TRICHLOROETHANE, 1,1,2-											
TRICHLOROETHYLENE											
TRICHLOROPHENOL 2,4,6-											
VINYL CHLORIDE											
XYLENES											
c Cancer Risk	nc	Noncancer Risk									

- \* S-2 Risk Value determined from human health toxicity data derived by MOEE Standards Development Branch staff
- MOEE Soil Clean-up Guideline (SGU) for boron is based on a hot water extract, and was developed by MOEE Standards Development Branch staff
- (\*1) 2-methyl napthalene soil criterion is applicable to 1-methyl napthalene with the proviso that if both are detected in the soil, the sum of the two concentrations cannot exceed the soil criterion.
- ( ) Value in brackets is based on meeting the indoor air cancer risk concentration which is below the indoor air background concentration used in the Mass approach
- \*\* Inorganic mercury criteria used.
- \*\*\* Soil criterion

a Soil criterion from Table A (potable groundwater situation) adopted to account for degradation to vinyl chloride

**8. Revisions to Appendix B.1.4: Derivation of Leaching-Based Soil Concentrations (Coarse Textured Soils).**

Appendix B.1.4 is a spreadsheet (Excel 5.0) which requires the following revisions:

- a) Replace the pyrene value of 0.04 in the "GW-3 Standard (ug/L)" column of the spreadsheet with the value 40. This will result (via cell formula) in a revised pyrene value of 252 in the column labelled "S-GW3 (mg/kg)".
- b) Also, in order to simplify the spreadsheet so that it more closely matches the modifications made by MOEE to the original Massachusetts process, the last nine columns ("S-1/GW1 to S-3/GW3") can be deleted for all chemical parameters. These column deletions will not affect the calculation of leaching-based soil values.

**9. Revisions to Appendix B.1.5: Derivation of Leaching-Based Soil Concentrations (Medium-Fine Textured Soils).**

Appendix B.1.5 is a spreadsheet (Excel 5.0) which requires the following revisions:

- a) As in the previous spreadsheet, replace the pyrene value of 0.04 in the "GW-3 Standard (ug/L)" column of the spreadsheet with the value 40. This will result (via cell formula) in a revised pyrene value of 252 in the column labelled "S-GW3 (mg/kg)".
- b) Again, in order to simplify the spreadsheet, the last nine columns ("S-1/GW1 to S-3/GW3") can be deleted for all chemical parameters. These column deletions will not affect the calculation of leaching-based soil values.

**10. Revisions to Appendix B.1.6: Derivation of GW-1 and GW-3 Groundwater Concentrations.**

Appendix B.1.6 is a spreadsheet (Excel 5.0) which requires the following revisions:

- a) Replace the pyrene value of 0.004 in the column labelled "Lowest Ambient Water Quality Criteria" of the spreadsheet with the value 4. This will result in a revised pyrene value of 40 in the third last column in the spreadsheet labelled "Groundwater GW-3 Proposed Standard (Raw value) ug/L".
- b) The value of 40 must also be manually entered into the second last column labelled "Groundwater GW-3 Proposed Standard (rounded) ug/L".
- c) The spreadsheet formula will replace "MDL-DW" with "LOEL" in the final "Basis" column for pyrene.

**11. Revisions to Appendix B.1.10: Derivation of Soil-to-Indoor Air Concentrations (Medium/Fine Textured Soils).**

**Appendix B.1.10** is a spreadsheet (Excel 5.0) which requires the following revisions:

- a) For each chemical in the spreadsheet, the C<sub>sp</sub> (soil particle conc.) value in Column G is derived by a mathematical function using corresponding values from Column B, C and F. This mathematical function requires the addition of a 6.25 factor in the numerator to correctly derive soil-to-indoor air concentrations for medium/fine textured soils.
  - b) For example, using Acetone which occupies row 10 in the spreadsheet, the corrected mathematical function is  $(F10*B10*0.00000024*6.25)/C10$  which replaced the incorrect mathematical function  $(F10*B10*0.00000024)/C10$ .

Note: The corrected mathematical function to derive Csp (soil particle conc.) results in the model generating new values for Csw (soil water conc.) as well.

12. Revision to Appendix B.4: U.S. EPA Ambient Water Quality Criteria (AWQC) for Fresh Water and Lowest Observable Effects Levels (LOELs) for Fresh Water Organisms from the Aquatic Information and Retrieval System (AQUIRE) Database.

The table in Appendix B.4 requires only one correction:

- a) The pyrene value of 0.004 (ug/L) in the table column entitled AQUIRE FWLOEL is replaced with the value 4 (ug/L).

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For those who do not currently have a copy of this document, all new requests after this date will contain the revised information.

For additional information on these changes, please contact:

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Copies of this Erratum can be obtained by written request to the above address, from the MOEE web site or via Fax request to: (905) 456-1003 or (416) 323-5166.

We regret any inconvenience these changes may have caused.





